DOCUMENT RESUME

ED 101 534 EC 071 879

AUTHOR	Wyman, Raymond; Bachus, Todd
TITLE	A Field Test of Electronic Telecommunication Terminals for the Deaf. Final Report, 1973-1974.
INSTITUTION	Massachusetts Univ., Amherst.
PUB DATE	Sep 74
GRANT	OEG-0-73-0534
NOTE	85p.
EDRS PRICE	MF-$0.76 HC-$4.43 PLUS POSTAGE
DESCRIPTORS	Adult Education; Aurally Handicapped; *Business; Communication (Thought Transfer); Computers; *Deaf; *Educational Technology; Electromechanical Aids; Equipment Evaluation; Equipment Utilization; Exceptional Child Research; *Interpersonal Relationship; Normalization (Handicapped); *Telephone Communication Systems
IDENTIFIERS	*TV Phone

ABSTRACT

Telecommunications devices for the deaf were evaluated in social communications, business uses, and educational and general data systems uses. Approximately 80 TV Phones placed in the homes of deaf adults were evaluated in such areas as equipment utility and reliability, and user reaction, through collection instruments such as user questionnaires and electronic devices for recording cumulative time for calls. Business installation of the TV Phone was done at a Montgomery Ward's Catalog Sales Office and use by approximately 412 deaf persons in the area who were informed of the service was evaluated. Exploratory applications of the communications equipment in educational/systems utilization was done through the media departments of two schools for the deaf, and a university instructional technology department which examined its use as an on-line computer terminal for handicapped individuals confined to home. Users in the social setting reported advantages of the TV Phone such as compactness and portability and disadvantages such as the lack of hard paper copies of conversations (which TTYs provide). Utilization of the telephone catalog ordering service increased during the study period from approximately 3 orders per week to 8 to 12 orders per week. Educational uses for the TV Phone identified included continuing educational programing for deaf adults. (LS)

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FINAL REPORT

NORTHEAST REGIONAL MEDIA CENTER FOR THE DEAF (OEG-0-73-0534)

1973-1974

"A Field Test of Electronic Telecommunication Terminals for the Deaf"

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27 September, 1974

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I. INTRODUCTION

Scope

A field test of electronic telecommunication terminals for the deaf was based on the identified need for alternative communication devices for the adult deaf population. For such a field test to be conducted most effectively requires a large sampling base from the population in question. The present study was necessarily truncated due to the limited time and resources available with which to conduct such a study. It was anticipated at the outset of this amendment that the identification of variables likely to be of principal concern in further evaluations of telecommunications with the handicapped in general and the deaf in particular would be identified. The evaluation plan which was developed for this field test emphasized placement of telecommunication units in the homes of deaf adults and other locations in order to determine empirically the dimensions of telecommunications rather than to provide a definitive analysis of the long-range effects of such devices on the lives of handicapped persons.

The intent of this field test then is to be suggestive of the course of future work in the area of determining the most appropriate and effective methods and procedure for including telecommunications for the handicapped.

General Features

The general features of the evaluation performed under this amendment include the utilization of a telecommunications device by the deaf in social communications, business uses, and educational and general data systems uses. The social communication uses of telecommunications devices received primary emphasis in this study. The vast majority of placements of instruments procured for this field test were made in homes of deaf adults in the Boston and New York metropolitan areas. Each individual who served as a participant in the field study provided data on a periodic basis before, during, and after the utilization of the particular equipment used in the study.

Several notions for examining the potential utilization of telecommunications devices in business or commercial settings were considered at the outset of this study. Ultimately, however, it was decided on the basis of time available and limitations of fiscal and personnel resources to concentrate on the utilization of a telecommunication device in a retail setting located in a region with a large number of deaf adults already possessing telecommunications devices.

Educational and general systems applications of a telecommunications device were examined in two ways. Units procured under this amendment were placed in school settings at locations where the use of educational media was relatively advanced. General systems applications were investigated by placing units at the disposal of an institution of higher education which provides educational services to handicapped and other individuals through the use of a widespread computer based instructional system.

Because of the need for expertise in survey research methods, it was determined that the resources of the Deafness Research and Training Center at New York University would provide most effective expertise in determining the sampling base development of data collection instruments, validation of instruments, and insuring that these aspects were consistent with commonly accepted practices used in the field.

II. METHOD

Social Communication

During August of 1973, the Project Director met with Dr. Jerome Schein, Director of the Deafness Research and Training Center, to determine the extent and kind of services to be contracted by the NRMCD. Subsequent to the initial meeting, further meetings were held between the staffs of the two organizations to determine the basic dimensions of the social communications research design. Several versions of the design were completed with a revised final version submitted to NRMCD by the Deafness Research and Training Center on 6 December 1973.

1. Research Design

The primary goals of the project are: first, to evaluate the TV Phone in terms of equipment utility and reliability, user reaction, and impact on the user's self-perspective; and second, to compare the TV Phone to presently used teletypewriters (TTY's) on these same criteria.

The term "user" will refer to individuals only and therefore will not include institutions. A separate research design for institutional users and for preselected government users will be prepared and implemented by the NRMCD.

A. Number of TV Phone Units

Approximately 95 TV Phone units will be supplied under contract by the Phonics Corporation to the NRMCD for evaluation. However, approximately 15 of these units will be placed with preselected individual users (such as federal government officials, who may provide little more than anecdotal information) or with institutional

users which will not be included in this part of the project. Therefore, approximately 80 TV Phone units will be available for the thorough field testing with individual users described below.

B. Schedule

Starting November 1, 1973, approximately 8 months will remain in the project schedule--roughly 7 months for selection of the user sample, for field placement of the units, and for data collection; and roughly 1 month for data analysis and preparation of the final report. We expect that the actual starting date for field placement may be closer to December 1 or to January 1 than to the suggested starting date of November 1, in order to properly select the sample of users and to adequately pretest the TV Phone before placement by members of the NRMCD staff.

C. Definition of Sample

Degree of hearing impairment is the first consideration. We recommend that units be placed only in households in which there is at least one deaf person. (For definition of "deaf person", see III A, Sample Selection.) The majority of the sample will already have TTY's in their homes; a subsample will only have the TV Phone. We anticipate that the most significant independent variable will be income (subgroups within the range of $4,000 to $25,000 annual earnings.)

Other important user characteristics will be age (subgroups within the range 19-65 years), education, occupation, and marital status and family composition.

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D. Geographic Considerations

Two potential areas for field evaluation were chosen to minimize the time and expense of travel and communication between the NRMCD and the actual TV Phone users. One or both areas will be chosen by NRMCD for the actual field tests, depending upon responses from the screener questionnaire. The areas are metropolitan Boston and metropolitan New York City. Actual placement of the TV Phone units will be made wholly at the discretion of the NRMCD staff.

The project will include the standard field evaluation elements: A. Sample Selection, B. Field Placement of the Units, C. Collection of Data, and D. Coding and Analysis of the Data.

A. Sample Selection

1. Population Base

The sample of potential users will be drawn from the lists of known deaf persons in the three preselected geographic areas. For purposes of this survey a deaf person is one who states he cannot hear and understand ordinary conversation through the unaided ear. The degree of impairment will be determined by means of the Hearing Scale used in the National Census of the Deaf Population.

For a sample of TTY users, the Directory of TTY Users will provide the frame. All institutional entries will be eliminated. From the remainder, successive samples will be drawn from entries in the relevant zip-code categories representing Boston and/or

New York City. The screener will be sent to each of the addresses selected, along with a cover letter inviting participation in the field test. Follow-up questionnaries and letters will be sent until the quota is completed.

For the non-TTY sample, the Deaf American list will be used (excluding verified TTY users). The procedures will be as described above.

2. Screener Questionnaire

A screener questionnaire that will be sent to all individuals identified in the composite list described above will serve three functions: (a) When compiled, the responses to the questionnaire will provide a demographic profile of the deaf populations identified in the three preselected areas. (b) The questionnaire will "screen out" individuals not suitable for inclusion in the sample of users of the evaluation, for example, because they are not deaf or because they have no telephone or television. These criteria will be established by NRMCD, based upon responses to the questionnaire. (c) The respondents to the questionnaire will form a pool of potential users from which the project participants will be drawn.

The usual procedure is to mail a cover letter describing the project along with the questionnaire; to wait approximately two weeks for responses; and then to mail a follow-up cover letter and questionnaire. We recommend these steps be followed in selecting the sample for this field test.

B. Field Placement of the Units

Minimally, the project staff would be thoroughly familiar with the units to be field tested, and the units should be individually prechecked for possible electrical or mechanical malfunction before they are placed with the users.

The users who have been selected would be notified by mail before placing the unit. At the same time, permission for access to the user's telephone bills (before, during and after the field evaluation) should be requested. In addition, for identified TTY users a short follow-up questionnaire should be administered in person to secure preliminary data on the extent of use and typical purposes of the participants' TTY use.

The TV Phone units will be delivered personally by NRMCD staff experienced in the use of the units. The user will be instructed personally and in writing about the use of the TV Phone. It is strongly suggested that several trial placements of the units be made before the final field placements in order that NRMCD staff learn to anticipate possible difficulties. A formal check list should be prepared by NRMCD for these staff members.

C. Data Collection

1. Data Collection Model

The following discussion suggests a straightforward design for apportioning and scheduling the placement of TV Phone units in each of the three geographic areas. Modification of the design may be necessary, of course, depending upon information secured from the screener questionnaire. For example, there may not be

enough potential deaf users in metropolitan Boston to fill the user quota for that area, thus necessitating adjustment of the field test sample.

The first 20 TV Phone units will be apportioned at the discretion of NRMCD in metropolitan Boston and/or metropolitan New York City. Each of these units will remain with a single individual user for the duration of the evaluation period, or for about 6 months. The next 60 units will remain with an individual user for only half the evaluation period (for about 3 months) before it is moved to a second user. Each unit will then stay with the second user for the remaining 3 months of the evaluation period. See Table 1.

Table 1

Alternative Distribution Plans
Assignment of 80 TV Phone Units for Field Test

Area	Time per Household		Total Units	Total Households
	6 months	3 months		
Boston (33 1/3% units)	7	40	27	47
New York City (66 2/3% units)	13	80	53	93
or				
Boston (50% units)	10	60	40	70
New York City (50% units)	10	60	40	70
or				
New York City (100% units)	20	120	80	140

Approximately 2/3 of the TV Phone units will be placed with people who already have TTY's in their home. The remaining 1/3 will be placed in homes which do not have a TTY, but which include people who are deaf or who have regular contact with the deaf community. See Table 2.

Table 2

Field Test Sample: TTY Users Vs. Non-TTY Users

	Entire 6 Months	First 3 Months	Second 3 Months	Total Tests
TTY Users	13	40	40	93
Non-TTY Users	7	20	20	47
				140

2. Data Collection Instruments

(a) Screener Questionnaire

As described above, the Screener Questionnaire will be used to determine demographic characteristics of the deaf population in each area, to screen out potential users who cannot be included in the project, and to form a pool of candidates from which the sample are chosen.

(b) Leave-Behind Questionnaire

This questionnaire will have two purposes: First, it will be a usage log for the unit, especially for the number, duration and time of day for local calls and whether or not the calls were user-initiated. Second, it will include the opportunity for the user to express reactions to the TV Phone itself and also to describe how the TV Phone is actually used; i.e., Does it always remain in the home? Does it use interfere with normal television viewings? Particularly important aspects are portability, quietness, absence of hard copy, reliability and cost.

Opportunities for suggestions to improve the TV Phone will be

provided in the questionnaire, and anecdotal information about TV Phone use will be requested also. An essential, special supplement to the questionnaire will be a log for recording equipment malfunction (including the accessory television set) and repair of the unit.

A second version of the Leave-Behind Questionnaire will be designed especially for TTY users and will be used in parallel with the version supplied to TV Phone users.

(c) Electronic Recording Services

Measuring devices built into the individual TV Phone units will record the cumulative time for all calls and can be monitored remotely by a master console located at NRMCD. Monitoring will proceed according to a predetermined schedule.

(d) Telephone Bills

Telephone bills will provide information about certain long distance calls (duration and time of day of user-initiated calls and of collect calls) and in some cities will provide the total "message units" of local calls. Comparison of telephone bills before, during and after the evaluation will indicate changes in telephone use during the evaluation period.

(e) Final Questionnaire

This questionnaire will repeat several key questions regarding user reaction to the TV Phone which were included in the earlier screener questionnaire. This questionnaire will also attempt to determine in a preliminary way the impact of the TV Phone on the self-perspective of the user. As suggested by NRMCD staff, the

measures of this self-perspective will include real and perceived social and economic independence, feelings of security, self-satisfaction, etc.

Ample opportunity will be provided for suggestions for equipment modification.

D. Analysis of Data

Broadly stated, the major dependent variable of the study is user reaction to the TV Phone. It can be defined according to three distinct measures, each of which should be included in the evaluation: To what extent does he use it?

How much does he like it?

What will he pay to purchase or lease it?

Refinements of these three measures will be accomplished through the use of the several survey instruments already described above: the Leave-Behind Questionnaire, the electronic recording device, the telephone bills, the final questionnaire, and the repair records. We anticipate that the most important independent variable will be income, but that age, education, sex, and marital status may also provide useful correlations.

The preliminary sample will consist of current TTY users and non-TTY users. The TTY users will be further divided into Group A, which will receive TV Phones and Group B, which will become the control group and therefore will receive none. Similarly, the non-TTY users will be divided into Group C, which will receive TV Phones and Group D, which will not. (Group D will be omitted from the final data sample.)

Similar analyses of data will be performed for each of the sample groups, A, B, and C, and then the results will be compared by means of multivariate analysis.

Further analysis, such as the change in user reaction over time, will be dependent upon the nature of the collected data.

* * * * *

We recommend four general approaches to the study of the TV Phone:

1. Questionnaire Items

These items must be designed to elicit basic demographic information, including income, age, education, sex, and so forth. In addition, user evaluations and attitudes should be solicited. Several dependent measures should be gathered at fixed intervals, minimally at the beginning and the end of the evaluation period. The purpose is to determine user reaction to the TV Phone both at the initial contact and after extensive use. In this way both consumer resistance and consumer acceptance can be evaluated.

Additional measures before initial contact, during the evaluation period, and after the instrument has been removed could provide further measures of these user reactions.

2. Objective Measures

Through the use of questionnaires and telephone bills a determination can be made of telephone use before, during, and after the evaluation period. A *t* test for correlated means will be used here.

Electronic recording devices on the TV Phone will be used in conjunction with telephone bills and the Leave-Behind questionnaire to compare the use of the TTY to the use of the TV Phone for selected users who have access to either or both during the evaluation period.

3. Additional Evaluation Items

These items may be solicited from the user by a combination of written questionnaires and by personal interview, probably at the very end of the evaluation period to coincide with the administration of the Final Questionnaire. Items might include: Do members of your household object to your using the television for your telephone conversations? Do you deliberately schedule your telephone calls to avoid competition with the family for the television? Do you mind that others can follow your private conversations when it is displayed on the television? How reliable do you believe the TV Phone is (as compared to the actual repair records)? How can the TV Phone be improved for your use?

4. Technical Evaluation

Staff members should make extended use of the instrument. It should be tested with a full variety of commonly available television receivers and with all possible accessories, such as audio-cassette recorders which permit permanent recordings of TV Phone conversations.

Complete records of the duration and cause of instrument malfunctions are essential as are records of repair. We strongly suggest, therefore, that all requests for repair or technical assistance come directly to the NRMCD and not to the manufacturer of the instrument. It would then be the responsibility of NRMCD to determine the nature of the malfunction and to repair the instrument or to engage the assistance of a third party to determine the malfunction and/or to repair the instrument.

2. Data Collection Instruments

Throughout the random sample field test of social communications, several instruments were utilized for the collection of data in each phase of the study. As described in the design section, the initial data collection instrument which was a screener, was used to obtain basic, demographic data on individuals identified as deaf through the TTY directory and the national census of the deaf data housed at Deafness Research and Training Center. The second data collection instrument provided data on users selected to participate and who elected to participate as subjects in the final sample of the study as a whole. Items on this questionnaire were concerned with subjective estimates of the worth of the instrument; items concerned with various uses of the instrument, and items concerned with self-perceptions of independence of users. This questionnaire was repeated in a changed form for each of the sample participants at the end of the usage period for each component of the sample. Because certain individuals who were initially elected to participate in the sample subsequently returned their instrument prior to the planned completion of a usage period, separate data collection instruments for early returns were prepared. In addition, a repeated measures on-line interview schedule was utilized periodically to determine changes in certain aspects of utilization of the instrument with actual use.

In addition to these basic data collection instruments utilized with the participants in the sample, there were other sources of data. Each user was polled periodically to get an electronic count of the amount of time the instrument was actually in use during the study period. Also, records were kept on the electronic and mechanical failures.

3. Procedure

In establishing the sequence of events to complete the field test evaluation, several related steps were followed. Beginning on the date of the initial request for amendment 25 May 1973, an initial conceptual design for the field test was developed. This conceptual design was later refined into the actual operational steps which were followed in the evaluation project. Precise definition of independent and dependent variables and their measures was completed in September of 1973. Because of the importance of insuring that good random population sampling procedures were followed where possible, a consulting relationship was established on 21 September 1973 with the Deafness Research and Training Center in order to draw upon the cumulative expertise of the staff of the Center in sampling procedures among the hearing impaired. Earlier meetings with the staff of that Center had led to the development of data collection instruments and subsequent revision by 30 September 1973. As part of the consultant services provided by Deafness Research and Training Center, these instruments were then field evaluated with a control population by 5 December 1973. On 6 December a revised field test design was completed and forwarded to the project officer.

The initial identification of the population sample for the study was completed on 20 September 1973. On 30 November 1973, mailing lists of the sources for the population sample were derived from subscriber lists of the publication, Deaf American, and from Teletypewriters for the Deaf, Inc., inclusive of the Boston and New York metropolitan statistical units.

From the lists of individuals identified in the sources of information for population sampling, an initial mailing of an introductory letter, a screener questionnaire, and return envelopes was sent to all households on the mailing lists by December 14, 1973. Responses were received from this initial mailing from 15 December to 28 December 1973.

On 21 December 1973 usage logs and equipment malfunction logs to be used by all subjects of all three tests groups were developed. These logs were duplicated on January 2, 1974.

Responses from the initial screener questionnaires were tabulated and keypunched and sorted for frequency by design cells by 15 January 1974. When the sort had been completed, a set of key questions to be used during an on-line data collection process were completed and a schedule for administering these questions was made. Each household selected to serve in the final sample for the study was located geographically by the end of January. A design was completed for the placement of instruments with each household serving in the final sample.

By 4 February 1974, a written list of instructions concerning the installation and use of the equipment in the study to accompany the distribution of each piece of equipment was developed. These steps were completed by 4 February 1974. Between the Fifth of February and the Thirteenth of February, locations for meetings of study participants were identified so that initial training for installation and use of the equipment could be conducted and that questionnaire administration could be completed. By 13 February 1974, letters announcing to the individuals, their selection in the sample, and the time and location for distribution meetings was completed.

Prior to conducting the initial placement and data collection meetings on March 16th in the Boston area, and March 23rd and 24th in the New York metropolitan area, project staff had been trained to administer the initial data collection instruments and to demonstrate equipment operation and hook-up. On 16 March and 23 and 24 March, initial placement meetings were conducted in which each individual user completed the initial data collection process and received hands-on instruction in installing and operating the equipment to be used in the study. In addition, the calling times for electronic duration polling and on-line data collection were scheduled with each individual user. Following these meetings, those individuals who were selected for the final sample but were unable to attend the initial placement meetings were mailed the initial questionnaires and their equipment for participating in the study. This was completed by March 29, 1974.

From April 8 to July 14, electronic frequency polling and on-line questionnaire data were collected from users in all of the groups in the study. From 25 March to July 14, usage logs were collected by mail from all participants. From the time of initial placement to July 14, participants in the study were called and did call project staff concerning problems of equipment malfunction, misunderstanding, confusion, etc.

In the early phases of placement, several people selected for the final sample who did receive instruments returned them for a variety of reasons and replacement households were identified to participate in the study. On July 6 and on July 13 and 14, 1974, regional meetings were conducted in the Boston and New York metropolitan areas to collect all TV Phones and for the administration of final data collection instruments at the end of the study. By August 14 those individuals participating in the

study who were unable to attend the regional meetings were individually contacted and their equipment was collected and final questionnaires were distributed. All equipment was collected from users by 19 August. Key-punching and coding of all data from questionnaires, logs, and periodic on-line questionnaires was conducted from 21 to 22 August.

Business

Several alternatives were explored for examining the potential use of electronic telecommunications devices for the deaf in a variety of business organizations. Among the alternatives given consideration were the placement of equipment in personnel departments of organizations employing large numbers of deaf individuals in certain metropolitan areas. In addition, consideration was given to providing equipment to state departments of police and medical service agencies. Because of the short amount of time available for conducting this project, many of the possible alternatives for examining utilization of electronic telecommunications devices and business settings had to be forgotten.

1. Systems Design

One member of the National Advisory Committee on the Handicapped is representative of the business community. This individual is Ms. Katherine Breen, who is director of training for Montgomery Ward, Incorporated. After having received the description of the basic nature of the evaluation project from BEH personnel, Ms. Breen communicated with me her interest in exploring possible utilization of telecommunications equipment for the deaf by Montgomery Ward. Between 5 and 8 March an initial meeting was held between the evaluation project director and personnel in Montgomery Ward's corporate headquarters in Chicago. It was determined that an area of exploration for which a usage system was to be developed was that of retail catalogue sales within the Chicago metropolitan area. As true of all large catalogue sales organizations, Wards provides telephone ordering services to its customers. In this case Montgomery Ward's operations are regionalized

with one region serving the Chicago metropolitan area. Catalogue sales orders are received by telephone at a central location adjacent to corporate headquarters in Chicago proper. A staff of approximately 30 individuals receives orders on individual telephone extensions from a central system and these are processed through CRT display to a computer control ordering unit. It was determined that through the simple expedient of installing one of the electronic telecommunication devices being evaluated by this project and training Ward staff to operate it, that hearing impaired individuals could, by dialing a dedicated line, conduct their retail purchasing business through normal catalogue sales operations.

The complex issue which was involved in obtaining Ward's participation in this aspect of the evaluation study, was to insure the willingness to cooperate at the corporate vice-presidential level. The decision to participate in this evaluation was based largely on the feasibility and lack of potential disruption of ongoing operations at the regional catalogue sales office. Approval was granted by the vice president for catalogue sales of Montgomery Ward's corporate headquarters.

Proceeding from that point, a system was designed which involved the placement of electronic communication devices in the catalogue sales office to receive calls on a dedicated line from hearing impaired individuals utilizing TTY communications. Staff from Montgomery Ward's catalogue sales telephone office were trained in the installation and utilization of the communications device and a unit was placed in the catalogue sales store in downtown Chicago to provide for those hearing impaired individuals on a walk-in basis.

2. Procedures

One major concern in completing this installation was in devising a means to inform hearing impaired individuals, with access to a TTY, availability of this service. On the basis of zip code numbers, TTY users were listed from the TDI directory and provided to Montgomery Ward catalogue sales personnel. Each individual on the list (approximately 412 in the expanded Chicago metropolitan area) received from Montgomery Ward a letter introducing the telecommunications service and a copy of the current Montgomery Ward catalogue. In addition, the National Fraternal Organization of the Deaf was notified as were the individuals concerned with a coincidentally scheduled meeting of all TTY users in the Chicago area.

On May 7 Montgomery Ward Public Relations Division conducted a press conference which resulted in distribution of the information about the service through newspapers, magazines and television news services (including captioned news for the deaf) in the Chicago metropolitan area.

Data on the feasibility of this type of business service to the deaf community were obtained by recording the number of calls received and orders processed through this service.

Educational/Systems Utilization

At the outset of this evaluation study, it was determined that effective evaluation of electronic telecommunication in educational settings could not be thoroughly evaluated in the time available for this project. Exploratory applications of the communications equipment were provided by the Media Departments at the Clarke School for the Deaf and the American School for the Deaf. Communications equipment were placed at the disposal of these schools for study as possible educational tools in dormitories, infirmaries, study halls, tutoring in homes of students too ill to attend classes and for two-way programming over existing close circuit operations.

In addition, the State University of New York's Instructional Technology Department agreed to examine the utilization of the equipment for possible use as an on-line computer terminal for handicapped individuals confined to home and in other applications. The technical modifications necessary to make the equipment evaluated compatible with time sharing computer systems was explored. This aspect of the evaluation study was a collaborative effort between this Center and Dr. Norbert Nathenson, and various agencies of the State University of New York system. It was felt that this application would provide implications for the general systems use of an educational nature. In addition, implications for possible applications of electronic telecommunications devices in management information systems and elsewhere would be determined.

III. RESULTS

The results of the evaluation study will be presented in several parts. The first part will be concerned with the procurement and functioning of the equipment used in the evaluation study. The second part will present the findings from the data on social communication. The third part will present information on business applications, and the fourth part will present information on educational systems applications.

Equipment

Upon receipt of approval for this amendment request and the specified funds on 21 June 1973, a set of functional specifications for equipment to be field tested were developed. These specifications were completed on 27 June 1973. The University initiated the competitive bid procurement process for the telecommunication equipment on 5 July 1973. Through this process, the functional specifications were distributed to prospective bidders either identified by BEH or through normal procurement channels of the University of Massachusetts. Bids were received on 9 August 1973, and the contract was awarded to Phonics Corporation of Silver Spring, Maryland on 15 August 1973.

Following award of this contract for the purchase of 95 "TV Phones," other steps had to be followed prior to receipt of the equipment. The contract was awarded to purchase 95 units at a price of $915 each with normal warranty. One of the units which was to serve as a master control unit included additional electronic circuitry to enable polling of the units to be

placed in the field. Polling would activate on the raster a set of binary digits which would translate into cumulative running time of each unit. The electronic counter unit cost $72 for each instrument. The University of Massachusetts required a performance bond by November 1973.

Of those units received, 25 of the 95 were defective for one reason or another and returned to Phonics Corporation for repair. This delayed the initial placement of units due to the time required to test fully the performance of each of the instruments prior to placement in the field. These performance tests were completed for all 95 units before 1 February 1974.

One of the inherent assumptions basic to exploring the utilization of electronic rather than electro-mechanical communication devices for use by the deaf and other handicapped persons is that the reliability of electronic equipment is expected to be higher than that of electro-mechanical equipment. While no direct comparison was made of relative frequencies of repair and maintenance between the two types of equipment, the fact that 26.3 percent of the units procured with which to conduct this field evaluation arrived defective in one way or another indicates the need for further developmental work in a manufacturing processes for such equipment.

One 28 January 1974, NRMCD received a letter from Mr. Ronald G. Moyer, president of Digilog Systems, Incorporated. The letter stated that on 15 March, 1974 Digilog Systems, Incorporated entered into a formal contract with Phonics Corporation whereby Digilog granted to Phonics certain licensing rights for the use of engineering plans, drawings and specifications developed by Digilog on certain telecommunications equipment. Mr. Moyers

stated that:

"We hereby regret to inform you that due to certain contract violations Digilog has withdrawn the licensing privileges previously held by Phonics and until or unless these violations are corrected, Phonics (or its predecessor RMS Industries) no longer has the right to sell, lease, or rent "TV Phones" equipment or any similar equipment based on Digilogs designs or subsequent improvements thereon."

The receipt of this notification caused considerable concern over the possibility of continued availability of the particular instrument with which we were concerned. In addition, questions regarding the availability of parts, maintenance and repair services for the TV Phones required resolution. In consultation with the attorney for the University of Massachusetts, inquiries were sent to the project officer, the president of Digilog Systems, Incorporated and the president of Phonics Corporation requesting clarification of the issues raised by the action of Digilog Systems, Incorporated against Phonics Corporation. The only response received to our inquiries concerning continued availability and service for TV Phones was from the president of Phonics Corporation. No response was received concerning future proprietary interests from Digilog Systems, Incorporated nor was a response received from Bureau of Education for the Handicapped legal staff concerning contractual obligations of the University and by the University. It must be concluded that this issue remains unresolved.

Several times throughout the course of this study, instruments placed with individual users failed to function for a variety of reasons. Many times equipment did not operate effectively because of a user not following

carefully the instructions provided in a printed form with their unit or at the initial distribution meetings. However, there were other problems which arose following the equipment performance checks performed by our staff. Among the component failures which occurred were the following: individual letters would not generate characters on a TV screen. In many cases this failure could not be detected in the test laboratory for equipment operated by Phonics Corporation. The switch on the TV Phones which serves to clear the screen of letters failed and had to be replaced. Diodes failed in certain units and transistors failed in pick-up microphones. In one case the circuit fuse in the TV Phone unit required rewiring.

Upon inquiry we determined that the normal service policy of Phonics Corporation is to ship a new unit to a customer upon receipt of a defective instrument. In the case of the units utilized in this study, each of which was specially modified to include an electronic polling counter, same day repair service could not be provided. Those cases where a unit had to be returned to the equipment supplier for repair or maintenance, the average turn around time for repair of the unit was approximately two weeks.

Generally, relationships with the equipment supplier, Phonics Corporation, have required for the purposes of this study an inordinate number of telephone calls between Silver Spring and the University. Phonics Corporation licenses for assembling and repair of units a division of the American Machine Foundry Corporation in Alexandria, Virginia. And apparently, as noted above, they have received manufacturing rights from Digilog Systems, Incorporated. In a normal course of business, Phonics Corporation

can be considered a relatively small equipment supplier when compared to suppliers of more generally available electronic equipment. It is assumed that due to the size of the organization supplying the TV Phones to this study, certain disadvantages and advantages accured to the project. Among the advantages was that direct contact could be maintained with the president of Phonics Corporation as difficulties arose in dealing with malfunctions or failures of equipment. Among the disadvantages was the fact that there is only one location in the country from which and at which the equipment can be received and repaired.

Social Communication

Items were included on questionnaires given to users concerning mechanical functioning of the TV Phone instruments. Data on the mechanical functioning of these instruments were obtained primarily from two sources: the individuals initially chosen as members of the study sample who returned the instruments prior to completion of the designated period of use, and those individuals who utilized the instrument throughout the designated period.

Of those individuals who returned their instruments early, 11 categories were utilized for identifying reasons for the early return. A total of eighteen individuals did not complete the stated period of use of the TV Phone. Of those eighteen, sixteen were at the time also TTY users. By far the greatest frequency of reasons given by these individuals for returning the TV Phone appears as Item 11 in Questionnaire #5. This Item is a simple statement that they would rather use the TTY, followed by an open-ended explanation. Prior to discussing those reasons, the less frequently used categories will be described.

Item 1 on Questionnaire #5 indicated a lack of understanding of the installation of the TV Phone. Two TTY users and 1 non-TTY user indicated that this was the reason for their return of the instrument. Item 4 on the questionnaire was a statement that the TV Phone did not work properly. Three TTY users indicated that this was the reason and two non-TTY users indicated improper operation as a reason for return. Item 5, a statement of dislike for a lack of permanent record of the the conversations, was indicated by six of the TTY users and none of the non-TTY users as a reason for return. Items 6 and 7 indicating

respectively, a concern over an undue increase in phone bills and a lack of individuals to call were indicated first by one non-TTY user, and secondly, by two non-TTY users. No TTY users indicated that these categories were reasons for returning the TV Phone. Item 8 was indicated by two TTY users. Item 8 expressed a concern with individuals in the family or others directly observing the conversations being held by the individual. Item 9 was indicated by four TTY users which expressed that the family members of the user objected to having TV programs interrupted while telephone conversations were taking place. Obviously, multiple responses were given for reasons for returning the TV Phone instruments.

A summary of responses to the open-ended item for early return of a TV Phone indicated some repetition of other items on the questionnaire. The major reason for preferring the TTY to the TV Phone was that the TTY supplied subjects with paper copy and the TV Phone did not supply a paper copy or a permanent record without the attachment of a dedicated cassette recorder. One subject felt the message on the TV Phone was often confusing and the inability to look back at the beginning of the conversation to reduce the confusion was seen as a disadvantage by the subject. Other subjects wanted paper copy so that they would have a permanent record of conversations to refer to in the future, to save for friends, for relatives, or to read at their leisure. Another subject noted that with paper copy, one had a record of addresses and phone numbers. Subjects also indicated that it is difficult for a deaf individual to copy this information from a TV screen because the movement

of the message cannot be stopped easily. Another subject preferred the TTY because she used the punch tape attachment to record the "Deaf Messenger" and reproduce it for friends who called her.

A number of the subjects had difficulty adjusting their TV sets so that they could read easily the print produced by the TV Phone. People who did not use a separate TV for their TV Phones, found the interruption of TV programs to be a major point of complaint. Subjects complained because the unit is not self contained and therefore there are three parts to the system liable to failure: 1) the telephone, 2) the TV phone, and 3) the television set. Subjects not using a separate TV set for their TV Phones, found that they could not answer calls quickly enough because of fine tuning adjustments to the set itself that had to be made. Statements were also included in response to this item that unless solid state television sets with instant "on" capability were used, the warm-up period for tube-type television sets delayed answering telephone calls. One interesting response to this item concerned the typing skills of users. Some people were concerned about the expense of utilizing the TV Phone that might be incurred due to very slow rates of typing. However, this objection would apply to any instrument requiring use of a typewriter keyboard by those individuals.

Of those individuals who completed the full period of use scheduled in the design for the TV Phone, it can safely be assumed that there was a basic satisfaction among these users with the instrument. However, certain general summary statements can be made which were drawn from the open-ended items included in the final user questionnaires.

Only one subject reported having problems installing and with operational

condition of the TV Phone. This was due to this individual's difficulty in locating a television set that would function properly with the TV Phone. This is most likely due to initial attempts to utilize an older tube-type black and white set that most likely had not had its VHF tuner cleaned for a long period of time.

A number of problems in using the TV Phone were described. One subject complained that the warm up time required by his television set prevented him from answering telephone calls immediately. Several subjects mentioned that the phone signal light did not work. The phone signal light is a white indicator light for status of dial tone, busy signal or phone ring. The chief complaint mentioned by most all subjects was that numbers were often received instead of or mixed with letters.

In response to the item asking users to state the thing disliked most about the TV Phones, the most common complaints centered on utilizing the television set commonly used for family entertainment. Subjects did not like interruptions of television programs or delay in answering calls caused by hooking up the TV Phone connector to the television set and also the warm-up period commonly experienced by users who had tube-type television sets was disliked. Many subjects had older, poorly maintained television sets which made it difficult to read the TV Phone message. Some subjects found reading a message from a TV Phone to be a subjective strain on the eyes. Almost all subjects complained about the absence of paper copy or another form or permanent record for telephone conversations. Subjects also complained about using the return key when communicating with a TTY

unit in a telephone conversation, and about the lack of reliability of the instrument with respect to random generation of numeric characters intermixed with letters.

The features that users indicated which they most liked about the TV Phone centered on the compactness, portability, quietness, and ease of operation. All subjects mentioned (whether they were current TTY users or not) that the principal advantage of the instrument was due to its basic purpose--that is, to communicate directly with deaf friends, and relatives.

The major reason given by subjects for preferring the TTY to the TV Phone was the presence of hard paper copy of telephone conversations with the TTY and that the TTY is a self-contained unit.

Several suggestions for improvement of the TV Phone were given by subjects. Among the suggestions were some changes to reduce the random generation of characters which is most likely due to phone line noise in the hertz range which activates the TV Phone. One subject suggested that the TV Phone have an 80 character keyboard instead of a 60 character one, so it would be more compatible with a TTY. Some subjects thought that a clearer instruction booklet would be an improvement. Other subjects indicated that they would like to see some kind of paper copy produced by the TV Phone which could not be accomplished without a basic design reconceptualization of the instrument. One subject indicated a desire for some kind of answering service to be provided with telecommunications devices.

Questionnaire #4 was an on-line interview which was conducted using

the TV Phone during a time instruments were placed with users. A total number of 36 subjects were interviewed during the study and some of these interviews were repeated during the course of the study. A total of 84 telephone interviews were conducted. The first item in the interview concerned the repetition of the subjective estimate of the worth of the TV Phone by users. In the initial questionnaire and in the final questionnaire, as well as during the on-line interviews, subjects were asked to place a dollar value that they would be willing to spend to obtain a TV Phone had it not been loaned to them for the purpose of this study. Thirteen point eight percent (13.8%) of the subjects responding placed a value from $0 - $100 on the TV Phone. Sixty-three point nine percent (63.9%) of the subjects placed the value between $101 - $300. Twenty-two point two percent (22.2%) placed the value of the TV Phone in the category ranging from $301 - $700.

The second item in the interview asked for a subjective estimate of the importance to the individual that a copy be available to store conversations conducted on the TV Phone. No mention was made in this item regarding the format of the copy. Nineteen point four percent (19.4%) of the subjects responding indicated that it was slightly important to have a copy of conversation. Twenty-five percent (25%) indicated that it was important, and sixteen point seven percent (16.7%) indicated that it was very important to have a copy of telephone conversations.

In order to tap subjects' perceptions of increased self-reliance and independence, two items were included as probes. Item 3 asked if subjects felt that if they owned a TV Phone would they be able to earn

more money. Fifty-two point eight percent (52.8%) of the subjects responding indicated that they did not feel that they would be able to earn more money. Eight point three percent (8.3%) indicated that they would be able to earn more money and thirty-eight point nine (38.9%) of the subjects were uncertain. This large percentage in an uncertain category indicates a likelihood of change toward a "yes" category if the duration of the study had been longer.

The fourth item concerned perceptions of safety with respect to the subject providing assistance to family or friends in times of emergency. Of the subjects responding, eight point three percent (8.3%) indicated that they never felt safe. Thirty point six (30.6%) indicated that they sometimes felt safe, twenty-two point two (22.2%) felt safe, and thirty-eight point nine (38.9%) of the subjects indicated that they felt very safe in times of emergency with the availability of the TV Phone.

Two open-ended items were included in the on-line interview which were replications of prior items concerning liked most and liked least features of the TV Phone. Responses were identical with those given to questionnaire items concerning mechanical functioning of the instrument discussed above.

In the area of exploratory utilization in educational and systems settings, a total of 19 instruments were placed in settings alternative to the basic research design for evaluation of social communication among deaf adults. Before describing specific applications identified, information similar to that derived from users in the field test concerning problems, likes, and dislikes will be described for the alternative users.

The instruments were utilized in several broad categories: used by the chairman of the Connecticut State Committee on the Deaf to provide direct communication with individuals and agencies within the state of Connecticut; used as an information resource index tool for deaf professionals; used by students at a residential school for the deaf for communication between facilities at the school and with parents; used to provide an evening news summary on a local basis; used by a PBS affiliate for a fund-raising auction; used by a field agent for the New York State Bureau for Physically Handicapped Children to provide statewide communication with various agencies and individuals concerned with the deaf and in certain other settings for area wide utilization of information systems notably at the Southern Regional Media Center for the Deaf.

In general, all alternative users complained that the performance of the TV Phone was erratic. Many felt that all of the "bugs" had not been sufficiently resolved. A chief complaint was that, as was true with individual users, numbers were often mixed with letters. Reception was sometimes a mixture of characters that was cleared if the message sender repeated the previously typed statements. Users found it inconvenient to have to use the return key on a TV Phone when communicating with a TTY. Only one user complained that the equipment was not compatible with other than standard model telephones and could not be used with trimline and princess phones. Another user found that he could not get reliable recording and playback with the hard wire coupling provided with the instrument. One user complained that the keyboard stuck, particularly in humid weather.

The characteristics most liked by the alternative users were principally the ability for special information agencies and individuals to maintain direct communication with their institutions and other agencies involved in professional work. Many alternative users liked the fact that the TV Phone is smaller and quieter than the TTY. Most felt it was easier to type on a TV Phone than a TTY, possibly due to the obvious difference between a mechanical and an electronic keyboard. Some users indicated that the automatic carriage return feature on the TV Phone was a positive convenience relative to TTY. The fact that the TV Phone does not intrude on surrounding activities in business and educational settings and that a larger screen display is possible with a TV Phone than on a TTY were described as positive attributes of the instrument. Users also pointed out that the keyboard configuration on the TV Phone does not require a shift key depression to generate characters such as question marks, the number one, etc.

Among these alternative users the disadvantage of interrupting ongoing use of the television set when telephone calls are received was indicated. It was suggested that in all cases the TV Phone be used with a solid state television receiver dedicated for use with the TV Phone alone. Some users disliked the lack of a permanent record of the conversation without ancillary equipment.

Several suggestions were made for other uses of the TV Phone. The major alternative use which was suggested was to provide emergency services for the deaf. It must be presumed that the availability of an emergency notification service by the manufacturer of the TV Phone was

not known to these users, or they felt that a service should be provided on a local basis. Some individuals suggested that the TV Phone be installed in public booths at transportation terminals. Other alternative uses suggested were that the TV Phone be used to provide information about news, area activity, social etiquette, health problems, and as a means to provide continuing education for deaf adults, or as a language teaching tool in schools for the deaf.

Business

As described in the procedure section, the primary business installation of the TV Phone was done at Montgomery Ward's Catalog Sales Regional Sales Office in the Chicago metropolitan office. The results of this application are different in kind from those obtained through the utilization of questionnaires and other data collection instruments. The involvement of a large corporate entity in a service to the handicapped normally consists in a job placement program rather than in providing a direct service to customers.

Of principle concern to the corporate decision making process throughout the course of this application was to minimize the disruption of ongoing activities directly attributable to the extension of retail sales services to a small component of the total possible retail market. The various decision makers involved in Montgomery Ward's operation found that the company required no inordinate expenditure of capital or staff time to engage in this broadened service to the handicapped. That is, functionally the only requirement placed on the operation was the addition of two pieces of equipment. Staff functions normally delegated in catalog sales remained identical to those provided for a non-handicapped market. The operation and reporting requirements for processing the catalog sales made by deaf individuals did not deviate at all from normal processing procedures.

The utilization of the service by the deaf community in the Chicago metropolitan area, as might be expected, began slowly. However, after the service was available for two weeks the impact of the efforts to

communicate the availability of the service resulted in an increasing number of catalog sales orders being placed by telephone. Beginning with approximately three orders per week being placed, the rate increased over the study period to a point at which eight to twelve sales orders were received each week.

An interesting sidelight from this particular operation was telephone calls received by the sales personnel at Montgomery Ward which were not directly concerned with the ordering procedure. Rather, deaf individuals occasionally would call the Montgomery Ward sales office to simply chat with the individual manning the TV Phone. The positive affective results generated by social communication occurring enhanced measurably the understanding and appreciation of handicapped people in general and deaf individuals in particular by the staff at Montgomery Ward.

Educational Systems

Several exploratory applications of the TV Phone in general educational utilization were made. These applications were made in the sense of exploratory work only. Of importance from these applications were several functions which the TV Phone could be used to provide--extended educational opportunities within a deaf community.

The need for opportunities for continuing educational programming for deaf adults was clearly identified. It was determined that within two metropolitan areas, hearing impaired adults could profit from courses in further language development, reading, consumer education, social studies (with emphasis on current events), and various job-related skill areas. It was suggested that schools for the deaf could be the focus for a system of continuing education and provide educational programming through the use of telecommunication instruments.

Another function that was identified as appropriate to be met by the utilization of TV Phones in schools was to provide communication between dormitories and a teacher on duty during the evening study hours. This type of application would provide direct contact between a teacher and students to clarify, reinforce and assist students in completing their academic assignments.

Another need identified which could be met through the utilization of the TV Phone or similar telecommunication devices was to provide supplementary instructional assistance in day programs for deaf children. A day program could, for selected students, provide an instrument such as

a TV Phone to be transported home in the afternoon and utilized for direct communication with an assigned teacher during the afternoon and evening hours.

The last need identified as appropriate for further development of telecommunications with the deaf is for providing educational activities to students confined to an infirmary or to their home during periods of illness. Ordinarily, assignments of materials and information must be transmitted by mail or through an itinerant teacher. It was anticipated that a system could be developed for utilizing telecommunication devices which would minimize the degree of staff time involved in ensuring an absence of disruption in the educational progress of deaf children due to illness.

One major area of exploration for the utilization of portable telecommunication devices in an instructional setting was to determine the possible use of such devices in conjunction with a computer assisted instructional system. In this study TV Phones were placed with the University of New York system for examination as a possible inexpensive computer terminal for use in conjunction with a time-sharing computer system. It was initially planned that this section of the report would be composed by the staff of the Center for Instructional Resources, the State University College, New Paltz, New York. Due to unforeseen circumstances, the Director of that Center could not complete in detail the evaluation of the TV Phone as a remote computer terminal. However, certain general findings were determined by his staff.

Generally, the TV Phone in its present form could, with an ancillary

device, be utilized as a computer terminal in limited applications. There are three areas of concern in order for a commercially available telecommunications unit to be utilized in this way with respect to a large scale computer system. These areas of concern center on hardware computer language and available computer assisted instructional programs.

Technically the TV Phone is limited in its operational capacity relative to more expensive and elaborate computer terminals. The number and type of characters generated by the existing unit are not in all cases directly compatible with many computer operations. Also, the hertz range for the modem presently employed in the TV Phone is different from that used by time-shared computer systems. The ancillary hardware necessary to change the hertz range of the TV Phone modem to that used by most computer systems would require an individually designed "black box" to modulate those frequencies. If that were accomplished, one additional suggestion made by the personnel of the Center for Instructional Resources was that if the units presently available were to be slightly modified, a tremendous increase in capability would be achieved. If five keys were added to the keyboard, thus increasing the available characters generated by the TV Phone, the programming and response capabilities of the TV Phone would be more consistent with the required functions of time-shared computer systems.

The language capabilities of time-shared computer systems exceeds those possible with the TV Phone. This again is a technical limitation which would have to be reserved given that the intent of exploring the possibility of using the TV Phone as a computer terminal is not to match

exactly the capabilities of larger or complicated terminal units. It would be a restriction in the number and complexity of computer languages able to be used with a TV Phone in its present state. For instance, Fortran 4 course program and Algol require additional character generation capabilities than are possible with the TV Phone. APL and other less complicated computer languages seemingly would be easily adapted to the capabilities of the TV Phone.

It was also pointed out by the Center for Instructional Resources staff that college level course programming for computer assisted instruction programs virtually requires a complex, sophisticated computer terminal. That is, courses in tests and measurements, statistics, etc., have functions in their feedback system for student response, which require the full capability of an eighty-character keyboard. However, lower level course programming such as basic informational programs, and elementary and secondary course work, do not require such sophisticated response mechanisms and seemingly would be most suitable for use with the TV Phone as a computer terminal.

TABLE 1

Demographic Data

Group	% Total Sample in Each Group	Average Age	Income (% Subjects)				Geographic Location (% Subjects)		Principal Occupations (% Subjects)				
			Below $7,000	Between $7,000 - $25,000	Above $25,000	No Response	Boston	New York	Ave. # years Completed in School	Professional or Technical	Clerical	Craftsman	*Other
1	45.1	45	8.7	69.6	13.0	8.7	26.0	74.0	12.5	26.1	17.4	17.4	39.1
2	19.6	44	20.0	80.0	0.0	0.0	40.0	60.0	12.5	20.0	20.0	20.0	40.0
3	31.4	47	63.0	68.8	6.3	18.8	62.5	37.5	11.3	37.5	18.7	6.3	37.5
4	3.9	41	0.0	100	0.0	0.0	50.0	50.0	15.0	0.0	0.0	0.0	100

N = 51

Group 1 = Subjects using TV phone as only means of telecommunications.

Group 2 = Subjects using both TV phone and tty as a means of telecommunications.

Group 3 = Subjects using both TV phone and tty as their only means of telecommunications who retuned TV phone prior to completion of study.

Group 4 = Subjects using TV phone as only means of telecommunications who retuned TV phone prior to completion of study.

*Other includes the following categories: sales, operatives, non-transport, housewife, no response.

IV. CONCLUSIONS AND RECOMMENDATIONS

It is important to recall that due principally to time constraints, the results of this study should be considered as suggestive of issues and variables for further study and not as a definitive analysis of telecommunications for the deaf. It is hoped that the data presented will enable in part the development of programmatic funding efforts to determine the most effective role to be played by Federal support of such services to the handicapped.

Also it should be recognized that there was no intent throughout this study to evaluate the TV Phone apart from the general concern over dimensions of social and other communications by the deaf. The TV Phone was used here as a means to examine certain aspects of telecommunications and not as the only device available or possible for such use. Clearly, conclusions can be drawn to support certain assumptions regarding the design, manufacture, and marketing of equipment specifically to be used by the deaf population.

Historically, the initial availability of telecommunication devices for the deaf came from the adaptation of discarded teletype writers by the efforts of the dedicated professionals. Large electronics firms find prohibitive the costs necessary for the development of devices for the very limited market represented by the deaf. Equipment adaptable for the needs of the deaf will become available only as related to general technological advances. The limitations detected here with use of the TV Phone were not insurmountable and are suggestive of equipment features to include in any devices to be developed or adapted in the future.

With respect to recommendations concerning telecommunications equipment, it is clear that there has grown up in the deaf, community certain expectations.

Since the teletypewriter has been in use since the early sixties, deaf users have come to rely heavily on hard copy of telephone conversations. A great deal of user resistence to the lack of hard copy was encountered throughout this study. Several interesting features of this issue can be described anecdotally. Many of the subjects in the study were asked why they placed such value on a hard copy. Responses were of two sorts; individuals either "had simply become accustomed to having hard copy"or felt that several readings of a conversation were necessary to insure complete understanding of all the language used in a given conversation. This latter reason is reinforced by the well-known general language deficiencies among the deaf.

It would seem that future studies could be conducted which would explore the effects on reading rate and comprehension of extended use of a device without hard copy. The utilization of electronic telecommunication devices for the express purpose of language improvement from K-12 and as adult continuing education suggests itself as an immediately available area of research and development. Programs for reading improvement which are currently available could be tape controlled or incorporated in CAI systems with little developmental efforts or expenses. This type of use would seem to be the most easily and economically accomplished application of telecommunication support for the deaf.

The results of the study indicate that the major problem encountered by users of the equipment centered on the need to attach the TV Phone to a TV set. For those users in whose homes only one TV receiver was available, the necessity of interrupting TV viewing to hook up and adjust the set was very unacceptable. Also, where the receiver used was not solid state, the warm-up time necessary was unacceptable. A device such as the TV Phone which requires the use of a dedicated receiver is not the most effective for use by the deaf.

In addition to the problems of interruption of entertainment viewing and delay for warm-up periods, the need to acquire a dedicated receiver poses a great financial burden for the average deaf adult. Even the most enthusiastic subjects in this study did not indicate a willingness to spend more than $700 to purchase a TV Phone. Since the retail cost of the unit is about $1,000 and a receiver would cost an additional $100-$150, it seems that economic variables are an important and critical factor in determining the future course of telecommunications for the deaf.

Future development of equipment should be such that the devices are fully self-contained and do not require a user to acquire an additional piece of equipment to use it. It would seem that a display raster and the necessary circuitry could be incorporated into a single unit together with the keyboard and modem with little difficulty. The possible use of LED technology should be explored as well.

One issue treated during the study was that of using the equipment when traveling. The need for a portable device to enable deaf adults to utilize pay phones and telephones in hotels, etc., is clear. However, there are many problems to be resolved before deaf people can have full access to telephone communications. With the exception of local calls, all pay phones and hotel phones require operator intervention for which an oral response and hearing are mandatory on the part of the caller.

The findings from the social communication data indicate that there is a real need for broader access to telecommunication services among the deaf. The average number of days a subject had the TV Phone in the household was 74.5 days which include the 16 subjects who returned the equipment ahead of schedule for one reason or another. The average number of hours that subjects used the instrument during that period was 90.7 which means that subjects used the TV Phone on the average of 1.2 hours each day. If those who returned

the equipment early and those who had a tty available for their use, then the per day usage was 1.3 hours. This rate of usage is quite high and indicates that the availability of a telecommunication device provides a much broader range of opportunities to deaf adults than is normally available. This can be supported anecdotally on the basis that subjects in both Boston and New York city established new friendships with other deaf people previously inaccessible. The long term social, psychological, and sociological implications of an increased range of social relationships certainly merits further study. It seems clear that social isolation can be measurably reduced through access to telecommunications.

The conclusions to be drawn from the examination of business applications are closely related to those of a social psychological nature in social communications. The specific application operated by Montgomery-Ward made available to deaf adults a retail service not previously possible. Such access to service can have very beneficial effects on the functioning and well-being of deaf adults. It would seem important to examine the long-term effects of such applications to include other services available by phone to hearing adults. It is also important to recognize that it is relatively inexpensive for a firm to provide such service to the deaf community.

Educational applications of electronic telecommunication devices for the deaf must center on the examination of broadened access to computer-based and computer associated instruction by the deaf. The technical problems identified in the study related to the specific instrument used are easily overcome. The development of the required hardware interfaces would require not advance in state-of-the-art of computer hardware. The importance of providing equal access to technological advances in education for the deaf cannot be understated.

Overall, the suggestions stemming from this study indicate that major deficiencies in social, economic and educational opportunities for the deaf can be substantially reduced or eliminated through the increased availability of telecommunication devices which are economical, reliable, and functionally self-contained. The suggestions for further inquiry derived from the data indicate that with no major developmental effort a broad range of problems can be addressed and resolved.

TV Phone Evaluation Project

Questionnaire #1

Background Information

NAME: _____ _____ _____
first middle last

ADDRESS: _____
Street

_____ _____ _____
City State Zip

TELEPHONE NUMBER: _____

DIRECTIONS:

Please read each question carefully and then make a circle around the answer that tells best how you feel.

1. If you were to buy your own TV phone, how much would you be willing to pay for it?

   A. $0 - 100
   B. $101 - 300
   C. $301 - 700
   D. $701 - 1100
   E. over $1100

2. How much would you be willing to pay each month to lease a TV Phone?

   A. $0 - 10
   B. $11 - 20
   C. $21 - 30
   D. $31 - 40
   E. over $40

3. How important is it to you to have a copy that you can save of conversations you have on the TV phone?

   not at all important a little important important very important

4. Do you think it is important to other people who will be with you when you are using the TV Phone that it operates quietly?

   not at all important a little important important very important

5. How much do you think your family will dislike it if the TV programs they are watching are interrupted by calls you make or receive on on the TV phone?

   very much much not so much it will not bother them.

6. Is it important to you that the TV Phone be portable?

not at all important a little important important very important

7. Is it a problem for you to place the TV Phone in the same room that your TV is now in?

no yes uncertain

8. If someone watches your conversation on the TV Phone, will it bother you?

no yes uncertain

9. How often do you expect to use the TV phone to call friends, relatives or co-workers?

never seldom often very often

10. Which method of communication would you prefer to use in an emergency?

TV Phone Telephone TTY

I prefer to make the contact myself someone else calls for me

11. Would you be willing to use the TV Phone as your only way of calling for help in a time of emergency?

no yes uncertain

12. How hard is it now for you to call your friends, relatives or co-workers?

very hard hard sometimes hard not hard

13. How often do you think you will use the TV phone to make and break appointments?

never seldom often very often

14. How often do you miss important meetings (social, business, etc.) because no one has contacted you about the meetings?

never seldom often very often

15. What method do you use most often to keep in touch with your friends relatives or co-workers?

TV Phone Telephone TTY

I prefer to make the contact myself someone else calls for me

16. How important is it to you to be able to call friends, relatives, or co-workers by yourself without depending on help from others?

Not at all important a little important important very important

17. How often would you like to make an appointment to visit your family, friends, and co-workers but do not because it is too hard to call them?

Never Seldom Often Very often

18. How often do you feel isolated from the hearing community?

Never Seldom Often Very often

19. Do you think you will feel less isolated from the hearing community because you have a TV Phone to use?

No Yes Uncertain

20. How often do you feel isolated from the deaf community?

Never Seldom Often Very often

21. Do you think you will feel less isolated from the deaf community because you have a TV Phone to use?

No Yes Uncertain

22. How safe do you feel about being able to help your family or friends in a time of emergency?

Never safe Sometimes safe Safe Very safe

23. Do you think you will feel safer about being able to help your family or friends in a time of emergency because you have a TV Phone to use?

No Yes Uncertain

24. Do you now live by yourself?

No Yes

If you answered No to question #24, please answer question #26.

If you answered Yes to question #24, please answer question #25.

25. How safe do you feel about living alone?

Never safe Sometimes safe Safe Very safe

26. How safe do you think you would feel about living by yourself?

Never safe Sometimes safe Safe Very safe

27. Do you think you would feel safer if you had to or do live by yourself because you have a TV Phone to use?

No Yes Uncertain

28. Do you think you would be able to earn more money if you have a TV Phone to send or receive messages from where you work?

No Yes Uncertain

TV Phone Evaluation Project

Questionnaire #2

Background Information

Name:_____ _____ _____
first middle last

Address:_____

_____ _____ _____
city state zip code

Telephone number:_____

Directions:

Please read each question carefully and then make a circle around the answer that tells best how you feel.

1. How long have you owned a TTY?

   less than 1 year 1-2 years 3-4 years more than 4 years

2. How much would you be willing to pay if you had to replace your present TTY and modem?

   A. $0-100
   B. $101-300
   C. $301-700
   D. $701-1100
   E. Over $1100

3. How important is it to you to have a copy that you can save of conversations you have on the TTY?

   Not at all important a little important important very important

4. If your TTY were portable, how often do you think you would take it with you on business trips, vacations, or other places?

   Never Seldom Often Very often

5. Do you feel that the conversations you have with your TTY are private even if others are present when you are having these conversations?

   No Yes Uncertain

6. How often do you miss important meetings (social, business, etc.) because no one has contacted you about the meetings?

   Never Seldom Often Very Often

7. Which method of communication would you prefer to use in an emergency?

   TV phone Telephone TTY I prefer to make the contact myself

   Someone else calls for me

8. Would you be willing to use the TTY as your only way of calling for help in a time of emergency?

   No Yes Uncertain

9. What method do you use most often to keep in touch with your friends, relatives, or co-workers?

   TV Phone Telephone TTY I prefer to make the contact myself

   Someone else calls for me

10. How often do you feel isolated from the hearing community?

    Never Seldom Often Very often

11. Do you feel less isolated from the hearing community because you own a TTY?

    No Yes Uncertain

12. How often do you feel isolated from the deaf community?

Never Seldom Often Very often

13. Do you feel less isolated from the deaf community because you own a TTY?

No Yes Uncertain

14. Do you think you are able to earn more money because you have a TTY to depend on to send or receive messages from where you work?

No Yes Uncertain

15. Do you think you have more friends because you can communicate with them or your TTY?

No Yes Uncertain

16. How safe do you feel about being able to help your family or friends in a time of emergency?

Never safe Sometimes safe Safe Very safe

17. Do you feel safer about being able to help your family or friends in a time of emergency because you own a TTY?

No Yes Uncertain

18. Do you now live by yourself

No Yes

If you answered No to question # 19, please answer question # 21.

If you answered Yes to question #19, please answer question # 20.

19. How safe do you feel about living alone?

Never safe Sometimes safe Safe Very safe

20. How safe do you think you would feel about living by yourself?

Never safe Sometimes safe Safe Very safe

21. Do you think you would feel safer if you had to live alone because you own a TTY?

No Yes Uncertain

22. How hard is it now for you to call your friends, relatives, or co-workers?

Very hard Hard Sometimes hard Not hard

23. How important is it to you to be able to call friends, relatives, or co-workers by yourself without depending on help from others?

Not at all important a little important important very important

TV Phone Evaluation Project

Questionnaire #3

Background Information

Name: _____ _____ _____
first middle last

Address _____
street

_____ _____ _____
city state zip code

Telephone number: _____

Directions:

Please read each question carefully and then make a circle around the answer that tells best how you feel.

1. How long have you owned a TTY?

   less than one year 1-2 years 3-4 years more than 4 years

2. If you were to buy your own TV phone, how much would you be willing to pay for it?

   A. $0-100
   B. $101-300
   C. $301-700
   D. $701-1100
   E. Over $1100

3. How much would you be willing to pay each mont.. to lease a TVphone?

   A. $0-10
   B. $11-20
   C. $21-30
   D. $31-40
   E. Over $40

4. How much do you think your family will dislike it if the TV programs they are watching are interrupted by calls you make or receive on the TV Phone?

   very much much not so much it will not bother them

5. Is it a problem for you to place the TV phone in the same room that your TV is now in?

   No Yes Uncertain

6. How important is it to you to have a copy that you can save of conversations you have on the TV phone?

   Not at all important a little important important very important

7. Is it important to you that the TV phone be portable?

   Not at all important a little important important very important

8. If someone watches your conversation on the TV phone, will it bother you?

   No Yes Uncertain

9. How important do you think it will be to your friends, relatives, or co-workers that the TV phone operates more quietly than the TTY?

   Not at all important a little important important very important

10. How often do you expect to use the TV phone to call friends, relatives or co-workers?

    Never Seldom Often Very Often

11. Would you be willing to use the TV phone as your only way of calling for help in a time of emergency?

    No Yes Unsure

12. How hard is it now for you to call your friends, relatives, or co-workers?

    Very hard Hard Sometimes hard Not hard

13. How often do you miss important meetings (social, business, etc.) because no one has contacted you about the meetings?

    Never Seldom Often Very often

14. What method do you use most often to keep in touch with your friends, relatives, or co-workers?

    TV phone Telephone TTY I prefer to make the contact myself

    Someone else calls for me

15. How important is it to you to be able to call friends, relatives, or co-workers by yourself without depending on help from others?

    Not at all important a little important important very important

16. How often would you like to make an appointment to visit your family friends, or co-workers but do not because it is too hard to call them?

    Never Seldom Often Very often

17. How often do you feel isolated from the hearing community?

    Never Seldom Often Very often

18. Do you think you will feel less isolated from the hearing community because you have a TV phone to use?

    No Yes Uncertain

19. How often do you feel isolated from the deaf community?

    Never Seldom Often Very often

20. Do you think you will feel less isolated from the deaf community because you have a TV phone to use?

    No Yes Uncertain

21. How safe to you feel about being able to help your family or friends in a time of emergency?

Never safe Sometimes safe Safe Very safe

22. Do you think you will feel safer about being able to help your family or friends in a time of emergency because you have a TV phone to use?

No Yes Uncertain

23. Do you now live by yourself?

No Yes

If you answered No to question #23, please answer question #25.

If you answered Yes to question #23, please answer question #24.

24. How safe do you feel about living alone?

Never safe Sometimes safe Safe Very safe

25. How safe to you think you would feel about living by yourself?

Never Safe Sometimes safe Safe Very Safe

26. Do you think you would feel safer if you had to or do live alone because you have a TV phone to use?

No Yes Uncertain

27. Do you think you would be able to earn more money if you had a TV phone to depend on to send or receive messages from where you work?

No Yes Uncertain

28. Do you think you are able to earn more money because you have a TTY to send and receive messages from where you work?

No Yes Uncertain

TV Phone Evaluation Project

Questionnaire #4 TV Phone Interview

Name:_____

Subject Code:_____

TTY:_____

Non-TTY:_____

Date:_____

1. If you were to buy your own TV Phone, how much would you be willing to pay for it?

$0 - 100	$701 - 1100
$101 - 300	over $1100
$301 - 700	

2. How important is it to you to have a copy that you can save of conversations you have on the TV Phone?

not at all important a little important important very important

3. Do you think you would be able to earn more money if you owned a TV Phone?

no yes uncertain

4. How safe do you feel about being able to help your family or friends in a time of emergency?

never safe sometimes safe safe very safe

5. What do you like most about the TV Phone?

6. What do you dislike most about the TV Phone?

7. Do you have any problems you would like to discuss?

TV Phone Evaluation Project

Questionnaire #5 Unit return follow up

Name: _____ _____ _____
first middle last

Address: _____

_____ _____ _____
city state zip code

Directions:

Please check any of the following reasons you may have had for returning the TV phone.

_____ 1. I did not understand how to install my TV phone.

_____ 2. I did not understand how to use my TV phone.

_____ 3. I could not locate the TV phone near my telephone and TV.

_____ 4. The TV phone did not work properly.

_____ 5. I disliked not having a permanent record of my conversations.

_____ 6. I was afraid my phone bills would be too high.

_____ 7. I did not know anyone to call.

_____ 8. I did not like members of my family or friends watching my private conversations on the TV phone screen.

_____ 9. My family objected to having the TV programs they were watching interrupted when I made or received calls.

_____ 10. The TV phone is hard for me to use because I do not know how to type.

_____ 11. I would rather use my TTY (please explain why).

_____

_____

_____

_____

_____ 12. Please write about any other reasons you may have had for returning the TV phone.

TV PHONE EVALUATION PROJECT

Questionnaire #6 Alternative Uses Follow Up

Name: _____ _____ _____
first middle last

Institution: _____

1. What is your job title or position? _____

2. Please describe how you have used the TV Phone.

3. Did you have any problems (mechanical or other) with the TV Phone? Please be as specific as possible.

4. What do you like most about the TV Phone?

5. What do you dislike most about the TV Phone?

6. What suggestions do you have for improving the TV Phone?

7. What suggestions do you have for other uses of the TV Phone?

TV Phone Evaluation Project

Questionnaire #7

Background Information

NAME: _____ _____ _____
first middle last

ADDRESS: _____
Street

_____ _____ _____
City State Zip

DIRECTIONS:

Please read each question carefully and then make a circle around the answer that tells best how you feel.

1. If you were to buy your own TV phone, how much would you be willing to pay for it?

A. $0 - 100
B. $101 - 300
C. $301 - 700
D. $701 - 1100
E. over $1100

2. How much would you be willing to pay each month to lease a TV Phone?

A. $0 - 10
B. $11 - 20
C. $21 - 30
D. $31 - 40
E. over $40

3. How important is it to you to have a copy that you can save of conversations you have on the TV phone?

not at all important a little important important very important

4. How important was it to other people who were with you when you used the TV Phone that it operated quietly?

not at all important a little important important very important

5. Did you use a separate TV for your TV Phone or did you use the TV your family watches?

I use a separate TV I use the TV my family watches

6. How much do you think your family disliked it when the TV program they were watching was interrupted by calls you made or received on the TV Phone?

very much much not so much it did not bother them

7. Is it important to you that the TV Phone be portable?

not at all important a little important important very important

8. How often did you take your TV Phone with you?

never seldom often very often

9. Was it a problem for you to place the TV Phone in the same room that your TV was in?

no yes

10. If someone watched your conversation on the TV Phone, did it bother you?

no yes

11. How often did you use the TV Phone to call friends, relatives or co-workers?

never seldom often very often

12. Which method of communication would you prefer to use in an emergency?

TV Phone Telephone TTY

I prefer to make the contact myself someone else calls for me

13. Would you be willing to use the TV Phone as your only way of calling for help in a time of emergency?

no yes uncertain

14. Did the TV Phone make it easier for you to call friends, relatives, or co-workers?

no yes uncertain

15. How often did you use the TV Phone to make and break appointments?

never seldom often very often

16. While you had use of the TV Phone how often did you miss important meetings (social, business, etc.) because no one contacted you about the meetings?

never seldom often very often

17. What method do you use most often to keep in touch with your friends relatives or co-workers?

TV Phone Telephone TTY

I prefer to make the contact myself someone else calls for me

18. How important is it to you to be able to call friends, relatives, or co-workers by yourself without depending on help from others?

Not at all important a little important important very important

19. How often while you had use of the TV Phone, did you want to make an appointment to visit your family, friends, and co-workers but did not because it was too hard to call them?

Never Seldom Often Very often

20. How often do you feel isolated from the hearing community?

Never Seldom Often Very often

21. Did you feel less isolated from the hearing community because you had a TV Phone to use?

No Yes

22. How often do you feel isolated from the deaf community?

Never Seldom Often Very often

23. Did you feel less isolated from the deaf community because you had a TV Phone to use?

No Yes

24. How safe do you feel about being able to help your family or friends in a time of emergency?

Never safe Sometimes safe Safe Very safe

25. Did you feel safer about being able to help your family or friends in a time of emergency because you had a TV Phone to use?

No Yes

26. Do you now live by yourself?

No Yes

If you answered No to question #26, please answer question #28.

If you answered Yes to question #26, please answer question #27.

27. Did you feel safer about living alone while you had use of the TV Phone?

No Yes Uncertain

28. Do you think you would feel safer about living by yourself if you had a TV Phone to use?

No Yes Uncertain

29. Do you think you would be able to earn more money if you had a TV Phone to send or receive messages from where you work?

No Yes Uncertain

Please give us as much information as possible about the following questions. If there is not enough space allowed for your answer, please use extra paper.

30. Did you have any problems installing the TV Phone?

31. Did you have any problems using the TV Phone?

32. What did you like most about the TV Phone?

33. What did you dislike most about the TV Phone?

34. What suggestions do you have for improving the TV Phone?

TV Phone Evaluation Project

Questionnaire #8

Background Information

Name: _____ _____ _____
first middle last

Address: _____

_____ _____ _____
city state zip code

1. How often do you miss important meetings (social, business, etc.) because no one has contacted you about the meetings?

   Never Seldom Often Very Often

2. Which method of communication would you prefer to use in an emergency?

   TV phone Telephone TTY I prefer to make the contact myself Someone else calls for me

3. Would you be willing to use the TTY as your only way of calling for help in a time of emergency?

   No Yes Uncertain

4. What method do you use most often to keep in touch with your friends, relatives, or co-workers?

   TV Phone Telephone TTY I prefer to make the contact myself Someone else calls for me

5. How often do you feel isolated from the hearing community?

   Never Seldom Often Very often

6. Do you feel less isolated from the hearing community because you own a TTY?

   No Yes Uncertain

7. How often do you feel isolated from the deaf community?

   Never Seldom Often Very often

8. Do you feel less isolated from the deaf community because you own a TTY?

   No Yes Uncertain

9. Do you think you are able to earn more money because you have a TTY to depend on to send or receive messages from where you work?

   No Yes Uncertain

10. Do you think you have more friends because you can communicate with them or your TTY?

    No Yes Uncertain

11. How safe do you feel about being able to help your family or friends in a time of emergency?

    Never safe Sometimes safe Safe Very safe

12. Do you feel safer about being able to help your family or friends in a time of emergency because you own a TTY?

    No Yes Uncertain

13. Do you now live by yourself

    No Yes

    If you answered No to question #13, please answer question #15.

    If you answered Yes to question #13, please answer question #14.

14. How safe do you feel about living alone?

    Never safe Sometimes safe Safe Very safe

15. How safe do you think you would feel about living by yourself?

    [illegible] Safe Very safe

16. Do you think you would feel safer if you had to live alone because you own a TTY?

No Yes Uncertain

17. How hard is it now for you to call your friends, relatives, or co-workers?

Very hard Hard Sometimes hard Not hard

18. How important is it to you to be able to call friends, relatives, or co-workers by yourself without depending on help from others?

Not at all important a little important important very important

19. Is it easier for you to call your friends, relatives, or co-workers because you own a TTY?

No Yes Uncertain

TV Phone Evaluation Project

Questionnaire #9

Background Information

Name: _____ _____ _____
first middle last

Address _____
street

_____ _____ _____
city state zip code

Directions:

Please read each question carefully and then make a circle around the answer that tells best how you feel.

1. If you were to buy your own TV phone, how much would you be willing to pay for it?

   A. $0-100
   B. $101-300
   C. $301-700
   D. $701-1100
   E. Over $1100

2. How much would you be willing to pay each month to lease a TVphone?

   A. $0-10
   B. $11-20
   C. $21-30
   D. $31-40
   E. Over $40

3. Did you use a separate TV for your TV Phone or did you use the TV your family watches?

   I used a separate TV I used the TV my family watches

   (If you used a separate TV for your TV Phone, please skip question #4)

4. If you used the TV your family watches, how much did your family dislike it when the TV programs they were watching were interrupted by calls you made or received on the TV Phone?

   very much much not so much it did not bother them

5. Was it a problem for you to place the TV Phone in the same room that your TV was in?

   No Yes

6. How important is it to you to have a copy that you can save of conversations you have on the TV phone?

   Not at all important a little important important very important

7. Is it important to you that the TV Phone be portable?

   Not at all important a little important important very important

8. How often did you take your TV Phone with you?

   Never Seldom Often Very Often

9. If someone watched your conversation on the TV Phone, did it bother you?

   No Yes

10. How important was it to your friends, relatives, or co-workers that the TV phone operated more quietly than the TTY?

    Not at all important a little important important very important

11. How often did you use the TV Phone to call friends, relatives or co-workers?

    Never Seldom Often Very Often

12. Would you be willing to use the TV phone as your only way of calling for help in time of emergency?

No Yes uncertain

13. Did the TV phone make it easier for you to call your friends, relatives, or co-workers?

No Yes uncertain

14. While you had use of the TV phone, how often did you miss important meetings (social, business, etc.) because no one had contacted you about the meetings?

Never Seldom Often Very Often

15. What method do you use most often to keep in touch with your friends, relatives, or co-workers?

TV phone Telephone TTY I prefer to make the contact myself Someone else calls for me

16. How important is it to you to be able to call friends, relatives, or co-workers by yourself without depending on help from others?

Not at all important a little important important very important

17. How often, while you had use of the TV phone, did you want to make an appointment to visit your family friends, or co-workers but did not becuase it was too hard to call them?

Never Seldom Often Very Often

18. How often do you feel isolated from the hearing community?

Never Seldom Often Very often

19. Did you feel less isolated from the hearing community becuase you had a TV phone to use?

No Yes

20. How often do you feel isolated from the deaf community?

Never Seldom Often Very Often

21. Did you feel less isolated from the deaf community because you had a TV phone to use?

No Yes

22. How safe do you feel about being able to help your family or friends in time of emergency?

Never safe Sometimes safe Safe Very safe

23. Did you feel safer about being able to help your family or friends in a time of emergency because you had a TV phone to use?

No Yes

24. Do you now live by yourself?

No Yes

If you answered No to question #24, please answer question #26.

If you answered Yes to question #24, please answer question #25.

25. Did you feel safer about living alone while you had use of the TV phone?

No Yes Uncertain

26. Do you think you would feel safer about living by yourself if you had a TV phone to use?

No Yes Uncertain

27. Do you think you would be able to earn more money if you had a TV phone to depend on to send or receive messages from where you work?

No Yes Uncertain

Please give us as much information as possible about the following questions. If there is not enough space allowed for your answer, please use extra paper.

28. Did you have any problems installing the TV phone?

29. Did you have any problems using the TV phone?

30. What did you like most about the TV phone?

31. What did you dislike about the TV phone?

32. If someone offered to give you either a TTY or TV phone, which unit would you want? Why? (Please be as specific as possible.)

33. What suggestions do you have for improving the TV phone?